ENVIRONMENTAL MANAGEMENT SYSTEM FOR SMALL BUSINESS: A CASE STUDY AT A SHELL PETROL FILLING STATION, DZIYALITE RESOURCES SDN BHD

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ABSTRACT

Environmental challenges in today's world can be exigent to some, especially for small business. Environmental management system is introduced to find balance between business and environment. Operation of a petrol filling station is an example of small business that has potential impact towards the environment and poses hazards to people. The focus of this study is to present, based on a case study, the feasibility of environmental management system adopted at a petrol filling station by identifying activities in the petrol station that potentially contributes to environmental issues along with potential risks associated to chemical and physical hazards at the premise. Data was collected through a walk-through observation technique and environmental management system assessment checklist that was adopted from the ISO 14001 standard besides interviews and discussions with the petrol station management. Establishment of an environmental aspect and impact register and setting up environmental indicators are suitable environmental approaches in order to improve environmental management on site. Other potential improvements are conduct 5S practice monthly to promote better housekeeping at store room, provide zebra crossing or signage at accident-prone area e.g. forecourt, provide designated recycling bins to promote 3R practices and investing rainwater harvesting system to reduce cost on water consumption. Overall, most of the activities that have impact to environment and risks are being well-managed by the petrol station's management through various preventive controls as stipulated in their internal guideline. Future work recommendations could focus on gathering perception of environmental management system among petrol

station workers and identification and evaluation of significant environmental impact from petrol station activities.

Keywords: small and medium enterprises (SME), environmental management, environmental management system (EMS), petrol filling station, physical chemical risk

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ABSTRAK

Cabaran alam sekitar di dunia hari ini adalah sangat penting bagi sesetengah industri, terutamanya untuk perniagaan kecil. Sistem pengurusan alam sekitar diperkenalkan demi keseimbangan antara perniagaan dan alam sekitar. Operasi stesen minyak adalah contoh perniagaan kecil yang mempunyai impak terhadap alam sekitar dan menimbulkan bahaya kepada orang. Tumpuan kajian ini adalah untuk membentangkan, berdasarkan kajian kes, kemungkinan sistem pengurusan alam sekitar diterima pakai di sebuah stesen minyak dengan mengenalpasti aktiviti-aktiviti di stesen minyak yang berpotensi menyumbang kepada isu-isu alam sekitar bersama-sama dengan potensi risiko berkaita dengan bahaya fizikal dan kimia di premis. Data dikumpulkan melalui teknik pemerhatian dan semakan penilaian sistem pengurusan alam sekitar yang disesuaikan daripada standard ISO 14001 beserta temubual dan perbincangan dengan pihak pengurusan stesen. Penyediaan daftar aspek dan impak alam sekitar dan penggunaan penunjuk alam sekitar adalah pendekatan pengurusan alam sekitar yang dikenalpasti dari kajian ini untuk penambahbaikan sistem pengurusan alam sekitar. Selain itu, penambahbaikan seperti amalan 5S setiap bulan untuk mempromosikan pengemasan yang lebih baik di bilik stor, penyediaan persimpangan zebra atau papan tanda di kawasan kemalangan seperti forecourt, menyediakan tong kitar semula untuk mempromosikan amalan 3R dan pelaburan sistem penuaian air hujan untuk mengurangkan kos penggunaan air boleh dilaksanakan. Secara keseluruhan, kebanyakan aktiviti yang mempunyai kesan terhadap alam sekitar dan risiko sedang diuruskan dengan baik oleh pihak pengurusan melalui pelbagai kawalan pencegahan seperti yang tertulis dalam garispanduan dalaman oleh Shell. Cadangan kerja masa depan bolehlah

memberi tumpuan kepada pengumpulan persepsi sistem pengurusan alam sekitar di kalangan petugas stesen minyak dan pengenalpastian dan penilaian kesan alam sekitar yang signifikan daripada aktiviti stesen minyak

Kata Kunci : Industri Kecil dan Sederhana (IKS), pengurusan alam sekitar, Sistem Pengurusan Alam Sekitar (SPAS), stesen minyak, risiko fizikal kimia

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LIST OF SYMBOLS AND ABBREVIATIONS

3R	:	Reduce, Reuse, Recycle
ATM	:	Automated Teller Machine
EMAS	:	Eco-management and Audit Scheme
EMS	:	Environmental Management System
ERP	:	Emergency Response Plan
EU	:	European Union
HSE	:	Health, Safety and Environment
HSSE	:	Health, Safety, Security and Environment
ISO	:	International Organization for Standardization
OSHA	:	Occupational Safety and Health Act
PFS	:	Petrol Filling Station
PPE	:	Personal Protective Equipment
RELA	:	Retailer License Agreement
SDS	:	Safety Data Sheet
SKMM	:	Companies Commission of Malaysia
SMEs	:	Small and Medium Enterprises
TM	:	Territory Manager
VAHs	:	Volatile Aromatic Hydrocarbon
VOC	:	Voice of Customers
VOCs	:	Volatile Organic Compounds

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CHAPTER 1: INTRODUCTION

1.1 Background of Environmental Management for Small Business

In the wake of environmental revolution in the 1960s, which then rapidly growth in the 1980s and 1990s, large businesses were put to blame and the need for changes were high. However, towards the end of 1990s, small businesses were highlighted to make changes as well in order to achieve minimum to zero negative impacts towards the environment.

This move is crucial because small businesses, not only it operates in many different arena and were growing expeditiously, the cumulative environmental impact of the businesses can be immense. After all, the small and medium enterprise (SMEs) forms the backbone of Malaysia's economy.

Environmental challenges in today's world can be demanding to some, especially the SMEs sector which often inattentive of the impact of their business to the environment and also because lack of knowledge and expertise in addressing the environmental issues (Ortiz, Izquierdo, & Rodriguez Monroy, 2013).

In order to find balance between business and the environment, the environmental management is introduced, specifically through the implementation of the Environmental Management System (EMS) (H. A. Ferenhof, L. Vignochi, P. M. Selig, Á. G. R. Lezana, & L. M. S. Campos, 2014) where in a way, helps to increase their business profit and at the same time supports the sustainable development (Rutherfoord, Blackburn, & Spence, 2000).

EMS acts as a mechanism used by a company to identify measure and managing the effects of its activities to the environment. This can be done by setting a company's goal for environmental performance and plans to achieve those goals. For example, compliance to the environmental laws and regulations, use of natural resources, pollution prevention, and minimizing risks to human health and the environment. The

ability of a company to demonstrate environmental compliance eventually will enhance the company's corporate image, fulfill customers' requirements, and boost environmental awareness among employer and employees to gain a common view on environmental impacts of business activities. Besides that, implementation of a sound environmental management helps increase business' credentials as an environmentally aware operation which pledge to continual environmental improvement (Hillary, 2004).

Small business activities bring potential environmental liabilities such as ground pollution, waste water discharge and waste generation. Although the environmental impact from their activities seems small and non-significant, but cumulatively, many companies acknowledge that pollution is also part of its operational cost. Thus EMSs are more effective when they are part of normal business activities rather than a separate programs or initiatives.

1.2 Petrol Filling Station and Environmental Management System

A petrol filling station (PFS) by definition is a facility that sells fuel and engine lubricants for automobiles. The facility requires great prudence in terms of design, construction, installation and maintenance of its parts to ensure that it is in safe condition and secure throughout its lifespan. PFS also stores highly flammable liquid which makes it particularly hazardous workplace where likely there is risk to cause fire, explosion and any other unfortunate incidents (M. M. Ahmed, S. R. M. Kutty, A. M. Shariff, & M. F. Khamidi, 2011).

Operation of a PFS not only pose hazard to the people, particularly station workers, customers and contractors, but also potentially impacting the environment and its vicinity. Environmental impacts that may arise from PFS operations are soil, groundwater and surface water contamination, and vapor emission. In order to tackle and manage these impacts, an overall aim should be fuel containment integrity, from the

tanker off-loading point to the dispenser nozzle, through correct operational procedure, site design, construction and maintenance.

Implementation of an environmental management at PFS helps the retailer to identify potential environmental impact on daily operations, assessing current operations' environmental performance against statutory consent and company standard, setting up objectives and targets, and to continually monitor progress and improvement through environmental management plan.

1.3 Research Background

According to one of publications by the World Health Organization (WHO), urban growth in many countries has surpassed the ability of government in building essential infrastructures. This trend has brought with the increased use of automobiles, the need for fuelling services and subsequently, the expansion of petrol filling station.

By definition, a petrol filling station is a facility where fuel and lubricants for automobiles are sold; this includes petrol, liquefied natural gas (LPG), diesel (automated gas oil, AGO) and kerosene (dual purpose kerosene, DPK) (Wikipedia). These fuels, as characterized as flammable liquid can give off flammable vapor even at a very low temperature. Thus, it is possible for the risk of fire or explosion to occur if a source of ignition is present. Besides that, fuels can float on surface water and eventually will cause harm to the surrounding areas (HSE, 2010).

Due to this concern, it is the responsibility of the retailer of petrol station to endow HSE preventive measures such as risk assessment, staff training, vapor recovery system, emergency response plan, escape route and alarm system. After all, safety of the people and environmental protection are their major concerns (Han et al., 2005).

Based on studies and information above, one of a petrol filling station in Kuala Lumpur was chosen as the subject of this case study. Dziyalite Resources Sdn Bhd was established in year 2006. The petrol station is located at Kawasan Rehat dan Rawat, Kinrara KM46.6 KESAS Highway 58200 Kuala Lumpur. The company was registered under Companies Commission of Malaysia (SKMM) with registration no of 001602706-T.

Buildup area of this petrol station is approximately 40,000 square feet in dimension with 180 feet frontage length which holds six underground petroleum product storage tanks with each has the capacity of 30,000 liters connected to nine pump islands. This station store and sell two types of gasoline namely 95 and 97 and also AGO diesel. Besides that, it also has a convenience store which sells a wide range of variety such as food and beverages, newspapers, electronic gadgets and motor oil lubricants. Other ancillary infrastructures that located in the station are toilets, praying room, and storage area for general and scheduled wastes.

At the beginning of their establishment, Dziyalite Resources Sdn Bhd employed a total of 10 workers and to date it has 12 workers running in three shifts operation.

1.4 Problem Statement of Research

a) The needs to protect the environment and respond to changing environmental conditions has lead small business (e.g. Dziyalite Resources Sdn Bhd) to set for its environmental management.

b) Petrol filling station is one of hazardous working facilities that pose risk to not only those working in the station but also to its customers and contractors. Potential risks arise from activities at the petrol station that associated to chemical and physical hazards need to be identified.

c) The usefulness of environmental management system at selected petrol filling station need to be carried out as an approach to reduce potential environmental impacts and in attainment to comply with legal and other requirements.

1.5 Objectives

This study aims to review the feasibility of environmental management system for small business (SB) through a case study at Dziyalite Resources Sdn Bhd, a petrol filling station.

Specific objectives of this case study are:-

a) To identify activities and processes at a petrol filling station as a SB that potentially contributes to environmental issues.
b) To identify potential risks associated to chemical and physical hazards at the premise.
c) To assess the environmental management system of the area
d) To suggest suitable approaches for environmental management system

1.6 Outline of Research Approach

Background view on environmental management practices, benefits and hurdle in small business operation are studied through literature review in Chapter 2. In addition to that, topic on petrol filling station's management and its environmental impact and associated risks are reviewed from relevant literatures. Based on this, information on theories, models, materials and techniques that are used in previous research studies can be applied to current research.

Chapter 3 explains on methodology of study conducted to achieve objectives that were mentioned before. In order to learn the overall operation at Dziyalite Resources Sdn Bhd and to experience beforehand the daily operation at petrol station, a walk-

through observation was administered. Concurrently, EMS assessment is organized in order to oversee environmental management that is being implemented at the site as well as identification of possible risks associated to physical and chemical hazards.

Findings from the walk-through observation and EMS assessment were generated and presented in Chapter 4 for gap analysis. Chapter 5 discussed about recommendations to alleviate potential environmental impacts and risk issues that were highlighted in previous chapter. These recommendations are made based on priorities, benefits and limitation that arise in Dizyalite Resources Sdn Bhd for further improvements.

Chapter 6 explains about outcomes of research which highlighted satisfaction of specific research objectives, and also includes recommendations for future work.

Figure 1.1 below shown the summary outline of research approach

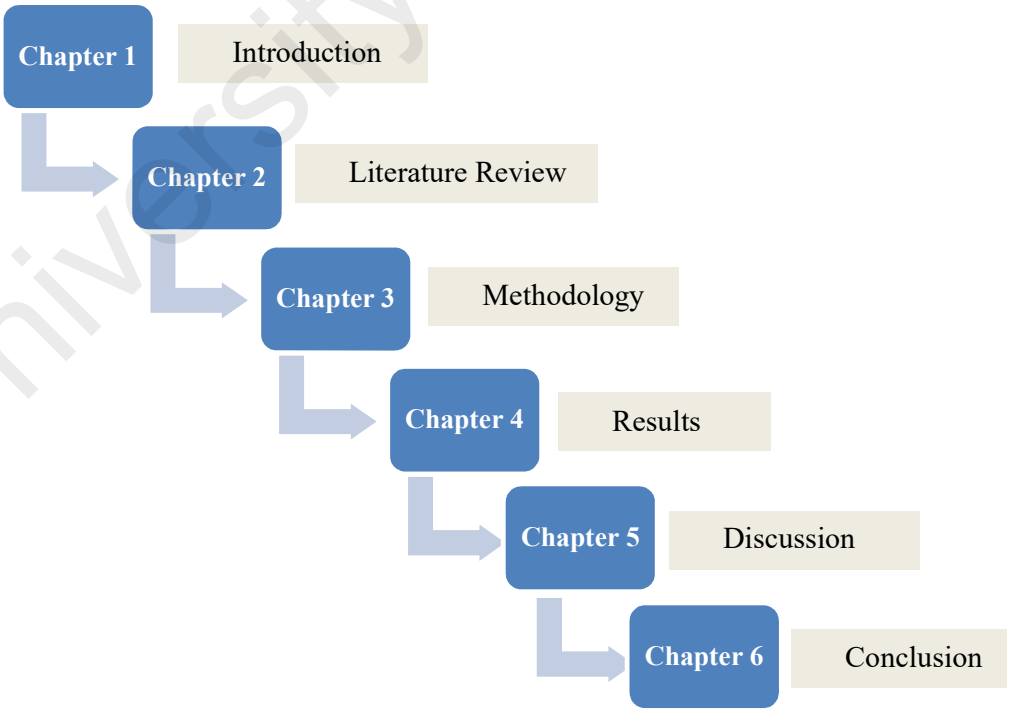


Figure 1.1 Outline of Research Approach

CHAPTER 2: LITERATURE REVIEW

2.1 Small Business and Environmental Impact

Globally, Small and Medium Enterprise (SMEs) constitute the dominant form of businesses organization, accounting for 95% or more of the business population depending on the country and definition of SMEs applied. SMEs in Malaysia's context was redefined in 2013 by the National SMEs Development Council which covers all sectors, namely services, manufacturing, agriculture, construction and mining and quarrying. The definition was based on two criteria which determine with OR basis as per Table 2.1.

Table 2.1 Definition of SME by Size of Operation

CATEGORY	SMALL	MEDIUM
Manufacturing	Sales turnover from **RM 300,000 to less than RM 15 million** OR full-time employees from **5 to less than 75**	Sales turnover from **RM 15 million to not exceeding RM 50 million** OR full-time employees from **75 to not exceeding 200**
Services & Other Sectors	Sales turnover from **RM 300,000 to less than RM 3 million** OR full-time employees from **5 to less than 30**	Sales turnover from **RM 3 million to not exceeding RM 20 million** OR full-time employees from **30 to not exceeding 75**

Source: ("Guideline for New SME Definition," 2013)

As a main player in today's economy and employment, SMEs collectively accounted for up to 70% of industrial pollution worldwide (Hillary, 2000). This has put pressure for firms to assess their impact on the environment, and to modify their attitude accordingly (Cassells & Lewis, 2011). It is also important for SMEs to improve and engaging their environmental performance and improvements, irrespective of their total yet unknown impact because they are vital part of the enterprise society that collectively contribute to sustainable development (CEC, 1992; Hillary, 2004; Rutherfoord et al., 2000).

Environmental responsibility among SMEs generally considered as failure due to their own low take-up rates in greening business practices (Battisti & Perry, 2011). SMEs often described as 'hard to reach' and lagging behind in terms of 'green business' due to management and resourcing issue characteristics of SMEs (Cassells & Lewis, 2011). They are also known for taking environmental actions only in response to threats and sanctions from the regulatory bodies which also refer to "end-of-pipe" environmental control solutions. This action was deemed as less effective than the total process control (P. Rao, la O' Castillo, Intal, & Sajid, 2006). NetRegs "SME_nvironmental" survey in 2003 concluded that majority of SMEs are heedless of their environmental impacts and relevant impinging legislation.

On the surface level, for a start, SMEs may implement small steps in order to manage their environmental impacts such as steps to reduce, reuse and recycle its material and wastes, minimizing impact of logistic, energy and water usage etc. to a more systematic plan like adoption of a formal environmental policy. Running an environmental management in SMEs is relatively easy as it does not involve complex organization structure which may reduce the decision-making process plus implementation of the system can be flexible to suit their operations. Performance of SMEs in environmental management should be assessed using benchmark that fit circumstances of small firms (Battisti & Perry, 2011).

2.2 Petrol Filling Station Management

Petrol filling station (PFS) could be any petroleum facility, service station, public garage, highway filling station, petro part or fuel depot that sales fuel and lubricant oil for motor vehicles. This facility may be called in different names across the world, but the purpose to which it is located remains the same (Mshelia, John, & Emmanuel, 2015).

Development activities such as high speed rail project, industries, airport and PFS have high potential to cause damage to the environment (Hassanain & Al-Mudhei, 2006). Thus, before a PFS is constructed, land suitability studies must be carried out in order to evaluate any environmental consequences that may damage the natural environment of the surrounding areas.

As an important but also hazardous facility, site selection for PFS need special attention during preliminary phase (Khahro, Matori, Chandio, & Talpur, 2014) and an Environmental Impact Assessment (EIA) model is able to assist the viability of this new proposed development project (Ali, Khan, & Hussain, 2012).

In terms of licensing management in Malaysia, permission to operate a PFS is stipulated under the Petroleum Development Act 1974. Application for permission to initiate or continue any business marketing or distribution of petroleum or petroleum products shall be made to the Secretary General of Ministry of Ministry of Domestic, Trade, Cooperative and Consumerism.

Other than that, PFS operation needs to adhere to one of the Malaysia's environmental legislations which are Scheduled Waste Regulation 2005. This applied to the generation, handling, storage and disposal of scheduled wastes that are generated by PFS.

2.2.1 Environmental Impacts by Petrol Filling Station

Generally, PFS has high potential of hazards to the site and its surrounding areas (Karakitsios, Delis, Kassomenos, & Pilidis, 2007). Environmental, hydrological, geological and socioeconomic are hazards that correlated to the operation of a PFS (Deeb, Hu, Hanson, Scow, & Alvarez-Cohen, 2001; Hassanain & Al-Mudhei, 2006).

In the view of environmental protection, the standard may varies from country to country where the level of protection are depending on legislations and economic priorities of the individual state (Mshelia et al., 2015).

According to a study, leading environmental impacts provoked by activities at petrol station are contamination of soil and groundwater. There are many sources of groundwater contamination and the most severe is through leakage in underground storage tanks (Mariano, Kataoka, Angelis, & Bonotto, 2007; Patrícia Bezerra Rocha, José Oenning Soares, & Dumke de Medeiros, 2011; Sacile, 2007). That is why in many parts of the world, underground tanks and piping storing of either petroleum or hazardous substances are subjected to regulations (Sacile, 2007). The characteristics of fuel that are rich in toxic substances of a mutagenic and carcinogenic character make it high in severity.

The leakage may seeps into the surrounding soil and groundwater which potentially damage nearby water bodies and ecological system (Zabel & Guignet, 2012). The root that causes leakage on these tanks are corrosion, cracks, defective piping and spill during refueling and maintenance (De Sousa, 2015). Other than leaking of underground storage tank, faulty installation and spillage from tank overfilling (Haest et al., 2010) are also leading cause of groundwater contamination (Sacile, 2007).

These findings were supported by (Freire, Trannin, & Simões, 2014) who concurred that the complexity of the phenomena in terms of interaction of these pollutants with soil and a large number of contaminated areas. This is due to the fact that it relates to health problem, environmental damage and adverse social impact.

Fuel that sells in petrol station has high energy density, which is known to cause high level of air pollution and is blamed for contributing to climate change and global

warming (Shukla, Pekny, & Venkatasubramanian, 2011). Vapor emission from gasoline is found to be one of major sources of air pollution in petrol station with present of wide range of volatile aromatic hydrocarbon (VAHs) in the air as a result of emission during dispensing, loading, unloading and transportation (Edokpolo, Yu, & Connell, 2014).

Effects from fire incidents in petrol station are also added causes of air pollution (Patrícia Bezerra Rocha et al., 2011) and groundwater contamination (Hassanain & Al-Mudhei, 2006). A study found that approximately about 243 incidents (from 1993-2004) related to fire at petrol station were recorded worldwide and electrostatic charges found to be the main precursor of fire generation (M. M. Ahmed, S. Kutty, A. M. Shariff, & M. F. Khamidi, 2011).

Following this statistics, America Petroleum Institute has issued a press release on "Do not get back into your vehicle during refueling" and "Discharge the static electricity buildup when you get out by touching the outside metal portion of your vehicle, away from filling point, before attempting to remove the nozzle" (Advisory) as awareness to customers.

Activities in a petrol station has becoming more complex, hence improving environmental management on site is one of the measure that carried out to contribute to the protection, preservation and environmental recovery (Lorenzett, Neuhaus, Rossato, & Godoy, 2011). Moreover, the cost of environmental incidents and its remediation is increasingly high, therefore, all activities must be carried out according to environmental law and legislations as well as maintain good work practices in order to lower down the risk to the environment, safety, employees and surrounding community (Catunda, Pinto, Ferreira, & da Costa Mattos, 2011).

2.2.2 Risks at Petrol Filling Station

Petroleum by-product is detrimental to human health. During filing of tank, there is an exchange of saturated vapor inside the tank of the vehicle by the corresponding liquid fuel coming from the underground tank (Correa, Arbilla, Marques, & Oliveira, 2012). Vapor can travel upwards through soil into nearby buildings and these vapor, also known as volatile organic compounds (VOCs) poses acute health risk such as asthma, headaches and mucosal symptoms caused by inhalation (Emara, Abo El-Noor, Hassan, & Wagih, 2010; Steinemann, 2009).

Petrol station is one of emission sources of VOCs, have been a subject of substantial study especially in design and control system to lessen the emissions (Ohlrogge, Wind, & Hassel, 2001). Workers in petrol station realized that they are exposed to risk factors, especially chemical risks due to their workplace being particularly dangerous (Cezar-Vaz et al., 2012).

From the perception study of petrol station workers conducted in Southern Brazil, they identified that chemical risk as paramount factors that they are exposed to followed by physical and biological risks (Cezar-Vaz et al., 2012). The approach of this risk perception study involves two factors; the magnitude of potential loss and probability of its occurrence (Sjöberg, 2000).

Frequent inhalation of vapors emitted by vehicles, direct handling of gas pumps and daily exposure to several liters of fuels were among main factors of exposure (Wiwanitkit, Suwansaksri, & Nasuan, 2001). Using of personal protective equipment (PPE), changing of clothes for each shift and application of hygienic measures such as hand washing are among protective measures taken by the management of petrol station to reduce risk of exposure and occupational accidents (Colman & Coleman, 2006).

Along with that, studies reported that petrol station make a significant contribution to ambient benzene concentration within their vicinity (Karakitsios et al., 2007) where the concentration ration of n-hexane and benzene found in the air of a petrol station is different from the one found in city air (which mainly from motor vehicle exhaust) (Morales Terrés, Miñarro, Ferradas, Caracena, & Rico, 2010). Automobile refueling is one of main source of benzene vapor production and it was found that long exposure to benzene can increased the risk of cancer (Udonwa, Uko, Ikpeme, Ibanga, & Okon, 2009).

On the other hand, workers in petrol station identified physical risks as feeling unsafe due to daily exposure to climatic changes, which represent discomfort caused by working environment itself. Besides that, most workers with longer duration on the job identified lack of physical safety as risk associated with robberies, explosions and being run over by vehicles (Cezar-Vaz et al., 2012).

2.3 Walk-through Observation

In a case study research, observation is the most frequent source of information. Based on a book written by (Hancock & Algozzine, 2016), there are five fundamental factors to be considered when conducting observations: (i) identify what need to observed to shed light on probable answers to research questions (ii) creating a list of features that wanted to be addressed during the observations (iii) gain admittance or access to the research study area (iv) recognizing researcher's personal roles and biases related to the research and (v) following all ethical and legal requirements on research participations.

Observation methodology can be defined in two categories which is the structured and unstructured observation. For structured observation, it is a more discrete activity with predetermined schedules whilst for unstructured observation, it is used to

understand (Mulhall, 2003) and interpret cultural behavior (e.g. in anthropological studies) (Kawulich, 2005). Other term used by (Kothari, 2004) is the controlled and uncontrolled observation. Main aim of uncontrolled observation is to get a spontaneous picture of activities or events while controlled observation have the tendency to use instruments as aid to accuracy and standardization.

(Mulhall, 2003) also stated that primary reason for researcher to adopt observation method is to check whether what people say they do is the same as what they actually practices on site. Other than that, through observation, it can provide acumen between dual or groups, illustrates the whole pictures and captures context and processes.

2.4 Environmental Management Concepts

The concept of environmental management is how a company manages its activities that contribute an impact towards the environment. Environmental management practices in SMEs may lead to sustainable success through the study of a business environment and identification of necessary adjustments to environmental impacts (Atanase, Schileru, & Visan, 2011).

There are varieties of environmental management's approaches through implementation of some existing standards that in a way helps to boost greening business options.

2.4.1 Eco-Management and Audit Scheme (EMAS) and ISO 14001 EMS

The European Union (EU) introduced the Eco-Management and Audit Scheme (EMAS) under regulation 1836/93/EEC in year 1995 that was then replaced by Council Regulation 761/01. EMAS is the EU voluntary tool which acknowledges organizations that improve their environmental performance on a continuous basis. It was developed by the European Commission especially for sites which are based in the EU.

In response to a need for environmental accountability and public access to information, the scheme requires participating members to: (i) set and implement policies, programs and management systems, (ii) review the performance of their site; and, (iii) regularly provide environmental performance report to the public. The reports will then being checked and verified independently by environmental verifier in order to preserve the organization's credibility and recognition.

International Organization for Standardization (ISO) has formed recommendations in implementing the Environmental Management System (EMS) which address many aspects of environmental management based on the ISO 1400. The two very first standards were developed are:

a) ISO 14004 presented a guideline on principal issues pertaining environmental management system and its implementation
b) ISO 14001 detailed out requirements in environmental management system which needs to be effectuated and demonstrated in order to show the effectiveness of the system.

ISO 14001 can be implemented by any size of organizations, in whatever level of their environmental maturity. The standard however, demand commitment to comply with relevant environmental legal and other requirements and to continuously improve as provided in EMS structure.

EMS is an array of processes and practices that facilitate a company in reducing its environmental impacts and simultaneously increase its operating efficiency. Besides that, it allows the company to systematically manage its environmental and safety health matter with its continual cycle of planning, implementing, reviewing and improving the processes and actions to meet its business and environmental goals (Zorpas, 2010).

2.5 Environmental Management Benefits

There are wide-ranging of benefits were reported in previous studies in favor to SMEs which adopting environmental management. The flexibility of the EMS, derived by a management-based approach (Lannelongue, Gonzalez-Benito, Gonzalez-Benito, & Gonzalez-Zapatero, 2015), makes it easily adoptable to all sectors and all types of businesses worldwide (Raines, 2002; Siew, 2015).

A business is considered to have formal EMS when it engages in formal certification process which are the International Standard ISO 14001 and the EMAS (McKeiver & Gadenne, 2005). These voluntary self-regulatory initiatives seek to provide all businesses with the means to develop systematic approaches in improving its environmental performance (Hillary, 2004). However, a company's organization must review their operations meticulously and analyzed how a company's activities affecting environmental issues (Campos, 2012). On the other hand, many businesses opt for environmental friendly alternatives such as recycling, waste management and energy conservation without actually engaging in formal certification process (Hillary, 1999).

According to (Hillary, 2004), the perks of implementing environmental management in SMEs can be summarized into two main categories: i) Internal benefits ii) External benefits.

2.5.1 Internal benefits

Three main positive outcomes from implementation of EMS within internal operation of SMEs and their examples are shown in Table 2.2.

Table 2.2 Internal Benefits Categories and Examples

Organizational benefits	Financial benefits	People benefits
Enhanced quality and investor in people	Improved economic condition of the company	Increased employee motivation, awareness and qualification
Quality of management improved	Cost savings from systematic waste management and energy conservation	Enhanced skills and improved knowledge among SMEs
Quality of training improved		Developed new interaction between staff and management hence provides intangible benefits such as enhanced morale[1]
Improved working condition and safety		
Fulfillment of legal compliance systematically documented and demonstrated		
Demonstrate environmental responsibility		
Provide strategic overview of environmental performance		

Source : (Hillary, 2004) ,

[1](Hillary, Gelber, Biondi, & Tamborra, 1998; Smith & Kemp, 1998)

Respondents in a survey by (McKeiver & Gadenne, 2005) from business owner and employees in SMEs also perceived that cleaner working environment followed by improving local environment and recycling are among the top benefits in implementing EMS.

2.5.2 External benefits

There are also positive outcomes from implementation of EMS in relation with external communication of an SME. Three main categories are recognized and the examples are shown in Table 2.3

Table 2.3 External Benefits Categories and Examples

Commercial benefits	Environmental benefits	Communication benefits
Gain new customers/business and satisfy existing customers	Improved environmental performance	Positive public image
Develop more environmental friendly products	Compliance with legal requirements	Develop good customer relationship
	Increased energy and material efficiency	Better cooperation and relationships with authorities and administrative bodies
	Reduced pollution	Improve communication with stakeholders
	Promote recycling	

Source: (Hillary, 2004)

For many SMEs, ISO 14001 and EMAS promote numerous financial, competitiveness and business rewards. Among key benefits from adopting EMSs are gaining new business and customers and at the same time satisfying existing customers' requirements (Elliott & Patton, 1996; Hillary, 1995; Mori, 1994).

Besides that, in terms of environmental benefits, it was noted that those improvements related to waste minimization and reducing energy consumption were frequently cited (Hillary, 2004). SMEs also found that their corporate image was enhanced, alongside with better cooperation and relationship with stakeholders (Elliott & Patton, 1996; Hillary, 1995; Mori, 1994).

2.6 Environmental Management Issues and Barriers

We can see that large companies may have dedicated more management time and resources to improve their environmental concerns. These companies often received

high pressure especially to abide with legal and other requirements, which motivate them to elevate their environmental performance. On the other hand, the environmental impact of small companies generally deem as negligible by managers and customers alike.

SMEs are often slow to respond to the challenge to improve their environmental performance (Rowe & Hollingsworth, 1996) and has low uptake on EMS (General, 2004). This may due to the fact that from employee perspective, environment is important to individuals but does not seem to be related directly to their work activities hence the organization context need to support both positive attitudes and the empowerment of employees (Petts, 1998).

Cost is recognized as critical hurdle for SMEs in going for EMS. SMEs usually operate on a hand-to-mouth basis and cost of undertaking any environmental initiatives is the major deterrent (Petts, 2000). Besides that, lack of funding for environmental projects or long period for return on investment (Vernon, Essex, Pinder, & Curry, 2003) tend to make SMEs view that environment is irrelevant to their business practices (Rutherfoord et al., 2000).

There were also reported that some components of the EMS failed to meet SMEs expectation which in return had impact on their resources. For example, failure in meeting the stakeholder's expectation, EMS did not integrate well with quality system and deprecate EMS requirements such as audit cycle where in EMAS could be less than three years (Hillary, 1998).

Other aspects that impede the implementation of EMS in SMEs are understanding and perception. Most SMEs are ill informed about EMSs structure and benefits which they can derive from the implementation (Baylis, Connell, & Flynn, 1997;

Charlesworth, 1998; Smith & Kemp, 1998). As the result, both ISO 14001 and EMAS hold a rather little interest for SMEs. Requirement in EMAS to produce public reporting somehow appalled them and implementation of ISO 14001 has an added disadvantage amongst companies which have had negative experiences with one of the ISO 900 standards (Hillary, 1998).

According to the pan-EU EMAS survey, environmental review and EMS element took SMEs the most time to implement, were among the most difficult to understand and required additional guidelines (Hillary et al., 1998). Correspondence among Italian organization employees concluded that the most difficult requirements to comply in ISO 14001 EMS were "Legal and Other Requirements", followed by "Competency, Training and Awareness", "Operational Control" and "Evaluation of Compliance"(Mazzi, Toniolo, Mason, Aguiari, & Scipioni, 2016).

2.7 Conclusion on EMS Implementation for small business

In conclusion, despite EMS being a voluntary standard, its adoption over medium and long term may lead SMEs to improve the control of their processes, products and services, meanwhile help to save costs and enhance profits (Epstein & Roy, 1997).

However, there are still majority of SMEs remain doubtful of the need to work on their environmental issues (Mori, 1994). This may due to the fact that they are facing internal and external barriers when seeking to address their environmental concerns and implementing EMS, but internal barriers seemed to have more significant impact in the process (Hillary, 2004).

Issues such as low awareness and absence of pressure from customers made them skeptical over benefits gained from making environmental improvements. Therefore, it is important to earn SMEs business owners-managers' viewpoint on the environmental

management needs in their business before implementing the system. Only when the management is ready to tackle their environmental concern, the awareness will eventually spread among their employees. After all, employee involvement is the key success of an EMS (Babakri, Bennett, Rao, & Franchetti, 2004).

In order for SMEs to succeed in environmental management, each SME must choose appropriate environmental tool that suit their specific environmental needs. This is because, SMEs are not homogeneous in size, complexity and activities (Starkey, 2000).

Application of EMS which broadly adapted from requirements of ISO 14001 allows for alignment of an organization's environmental policies with legal issues relevant to the assessment of its environmental impacts (Campos, 2012). It is also proven that EMS provides an effective environmental framework for which SMEs can implement and enhance their environmental performance (P. H. Rao, 2000).

CHAPTER 3: METHODOLOGY

According to the objectives of this study which was mentioned in Chapter 1, this research is based on a case study. Case study is an exhaustive study of one or more objects, which allows its broad and profound knowledge. This method also is one of the ways to understand overall process and operation of an organization.

Most of the studies conducted are via literature review, interviews with related personnel either structured (interview tools are fixed) or semi-structured (tool updated on emerging data), observations (plant visit) and archival sources (documents review, historical records, organization chart etc.) (Barratt, Choi, & Li, 2011; De Sousa, 2015)

Although there is a recommendation by (Miguel, 2007) to use a collective of case studies to generate more accurate results, but a researcher argued that a single case study can also produce results in a rare event or serve as a revealing way (De Sousa, 2015). Besides that, with few numbers of cases, there is greater opportunity for depth of observation (Voss, Tsikriktsis, & Frohlich, 2002) .

In this event, a single case study was performed in order to obtain more detailed information on activities at petrol station that may impact the natural environment. The research methodology that was adapted in this case study consists of the following processes:

a) Walk-through observation on processes and activities on site
b) Identification of physical and chemical risks on site
c) Assessing the environmental management system on site
d) Recommending suitable environmental management system on site

Generally, gathering of information and research report preparation are illustrated in Figure 3.1 below:

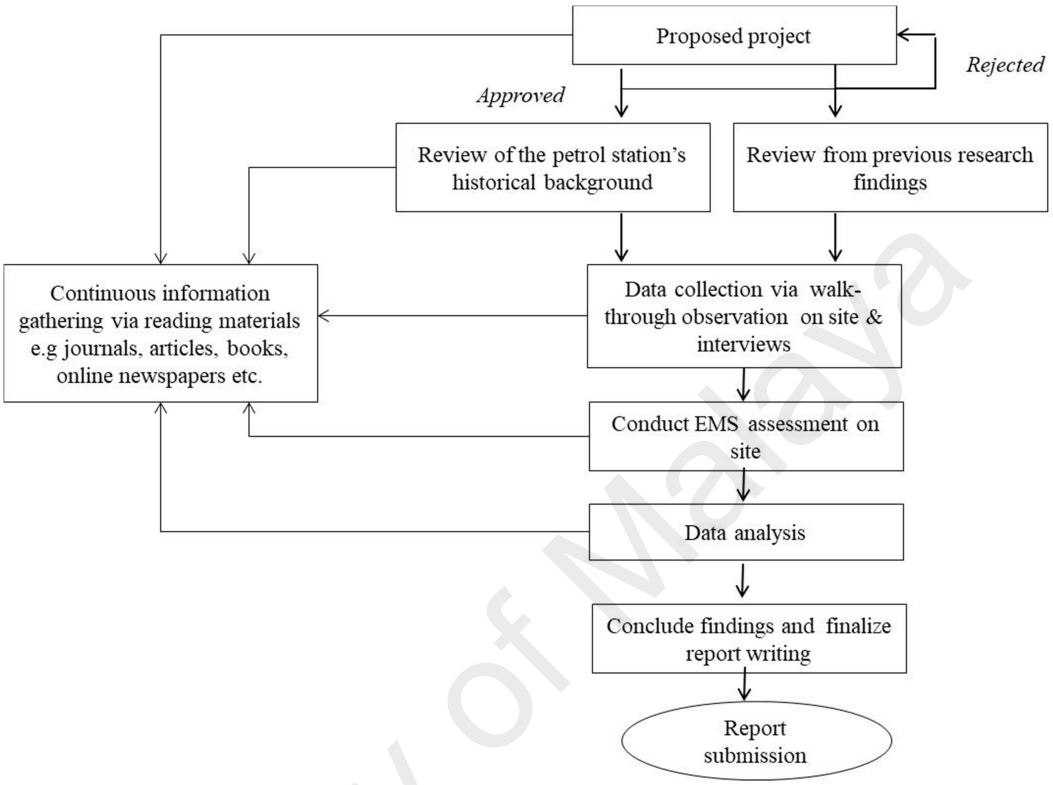


Figure 3.1 : Research Process Flow Chart

3.1 Study area and Justification

The petrol filling station that was subjected to this case study is a Shell petrol filling station, Dziyalite Resources Sdn Bhd. It is located at one of the busiest highways in Kuala Lumpur, KESAS Highway which is within the vicinity of a rest area, RNR Kinrara.

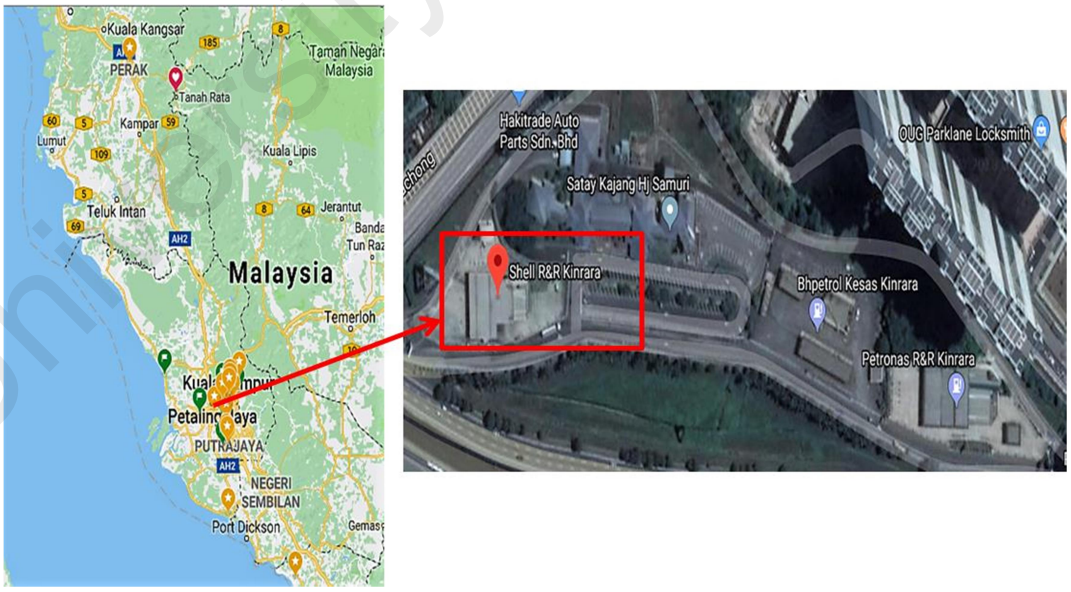
This petrol filling station is chosen as the focus of this case study is because of three main aspects as following:

a) Years of establishment

Dziyalite Resources Sdn Bhd has operated more than 10 years in business, making it to experience more mature and systematic HSE management. Besides that, as one of the top Shell Retailers in Kuala Lumpur, this petrol station has to maintain good reputation in term of business and also pertaining HSE matters.

b) Location

Located at one of the busiest highways in Kuala Lumpur, this petrol station is always occupied with customers coming in and out of the facility. This movement makes the petrol station area prone to untoward incidents and accidents especially during peak hours. The location map of this petrol station and its proximity is shown in Figure 3.2 below. From the satellite image, it can be seen that there is a food court area and two other petrol stations located nearby Dziyalite Resources. Thus, any potential environmental impacts and risk from the station may not only affect those in the petrol station but also to the neighborhood.



Source: Google Map

Figure 3.2 Location of Dziyalite Resources Sdn Bhd

c) Activities at support facilities

Support facilities such as toilets and praying room is available at the petrol station. Identification of activities at these facilities such as wastewater and waste generation that may have impact the environment can be visualized during the walk-through observations.

3.2 Sampling Method and Data Collection

Observation was conducted together with data collection during one year duration of research study. One petrol station was chosen as subject of this study because of limited access to other petrol stations within the vicinity and to gain in depth information of a petrol station's environmental management system.

On the first half of the year, data and information on the petrol station's background history, operational standard and practices, internal guidelines and policies were obtained from the management for reviewing purposes. The revision was in order to familiarize with terms and definitions used in the petrol station's operation as well to understand applicability of legal and other requirements that they must adhere to. At the same time, an assessment checklist was deliberately designed to suit the management and operation of this petrol station that to be used in EMS assessment.

Site visits to the petrol station was organized a few times in a year especially during the second half of the year. Visitation was seasonal, for example, during the school holidays, peak and non-peak hours, weekdays and weekends, festive seasons and such. The variation is that, to distinguish whether activities that have impact the environment (e.g. waste generation, energy and water consumption and etc.) may have increased or decreased during certain seasons or time in a week.

Other than that, visits were also made to observe certain processes at the petrol station such as offloading of fuel from the tanker, emergency response drill conducted by staff, toolbox talk session, and also collection of scheduled wastes from contractor. These activities were captured in camera as samples and are presented in Chapter 4 as observation findings result.

3.3 Walk-through Observation Data Analysis

Data collected from walk-through observations are pictures taken during site visits. These pictures are grouped according to five station zones area: (i) Forecourt area (ii) Underground storage area (iii) Main office and convenience store (iv) Support facilities area and (v) Waste storage room.

Summary of activities (from pictures taken) in these five zones are tabulated to show good work practices and potential areas for improvement. To conclude the analysis, potential areas for improvement are presented to the management of the petrol station for opportunity to improve.

3.3.1 Identification of Physical and Chemical Risks

From the walk-through observations, physical and chemical risks associated to the petrol station's operation are identified. The identification is analyzed visually during the site visits. Collected data from field notes and pictures taken were summarized in a table form to show types of physical or chemical risks that present at five station zones as mentioned in previous section.

3.4 EMS Assessment Data Analysis

An environmental management system assessment checklist which was adapted from the ISO 14001 EMS was deliberately designed to accommodate relevant data for this

study. Interviews, document checking and discussion with manager and workers were conducted in terms to define activities that impacted the environment.

Main aspects assessed were on elements in the ISO 14001 Standard such as waste generation, water consumption and energy usage, environmental incidents, environmental monitoring and measurement as well as relevant environmental training and awareness that are practiced on site. Site layout plan, emergency exit, material storage and handling, and maintenance records are among other useful information gathered for this assessment.

Data obtained from the assessment are then summarized into four categories as follow:

- **Nonconformance** for area assessed that are against the EMS element requirements
- **Partially conformed** for area assessed that are not fully conformed against the EMS element requirements
- **Conformed** for area assessed that are following the EMS element requirements
- **Opportunity** for area assessed that may have the possibility for a better environmental management.

Findings from this assessment are analyze and tabulated into categories as mentioned above which then be used as gap analysis in generating suitable environmental management system approaches for the petrol station.

3.5 Generation of Suitable Environmental Management System Approaches

Suitable environmental management system approaches are generated from findings of the EMS assessment and walk-through observation. These approaches are based on gap analysis that was carried out after the assessment.

Further discussion was administered with the manager and staff of the petrol station to prioritize recommendations based on benefits and limitations of environmental management system that may arise from the petrol station's operation. These recommendations are further discussed in Chapter 5. Besides that, ideas from literature search e.g. case studies, journals; books etc. are also being used to expand the options of better environmental management.

CHAPTER 4: RESULTS

This chapter summarized all the data and findings obtained from the walk-through observation and EMS assessment during one year duration of study conducted at Dziyalite Resources Sdn Bhd.

4.1 Walk-through Observation

In general view, as one of the petrol stations that located in the vicinity of RNR Kinrara, along one of the major highways in Kuala Lumpur, this 24-hour petrol station is always occupied with all sort of vehicles coming in and out to refueling their tank, grab some on-the-go, or stopping for washroom. The operation and activities at this petrol station is also not affected by seasonal period (e.g. festive season, school holidays etc.), weekdays or weekends, peak or non-peak hour of the day.

Aerial view of the petrol station is shown in Figure 4.1 below.

Figure 4.1 Aerial view of Dziyalite Resources Sdn Bhd

4.1.1 Station zones and activities

Different activities have been observed at different areas in the petrol station. For the purpose of this study, areas in the petrol station are categories in five station zones. Overview pictures of each station zones are shown in figures below.

- **Zone 1 – Forecourt area**

Forecourt area, which is shown in Figure 4.2 below, consists of a total of 18 pump islands where these pumps are connected to the diesel (AGO) and fuel (95/97) underground storage tanks. This area is where vehicles are refueled. Areas around the fuel dispensers are equipped with drainage system which can capture as little spill from refueling activity. Besides that, there is also an oil interceptor that is designed to trap and filter any hydrocarbon pollutants from getting into storm water drain or nearby ground area.

Figure 4.2 Forecourt area of the petrol station

- **Zone 2 – Underground storage tank area**

There are a total of six underground storage tanks as shown in Figure 4.3 below, which holds the capacity of 30,000 liters of fuel each, totaling 180,000 liters of fuel

stored. Two of the tanks are for diesel products and the rest are for fuel. Tanker truck will offload the fuel into the storage tank via separate valve which is located within the petrol station's perimeter. These fuels will then travel to dispenser pumps accordingly through underground pipes.

Figure 4.3 Underground storage tanks of hydrocarbon products

- **Zone 3 – Main office and convenience store area**

The main building which consists of an office and convenience store is located in front of the forecourt area as shown in Figure 4.4 below. Inside this building there are two store rooms and a washroom for staff. There is also a cashier counter, a self-service coffee machine, an automated teller machine (ATM) and high chairs for customers who may want to grab quick delis before hitting the road.

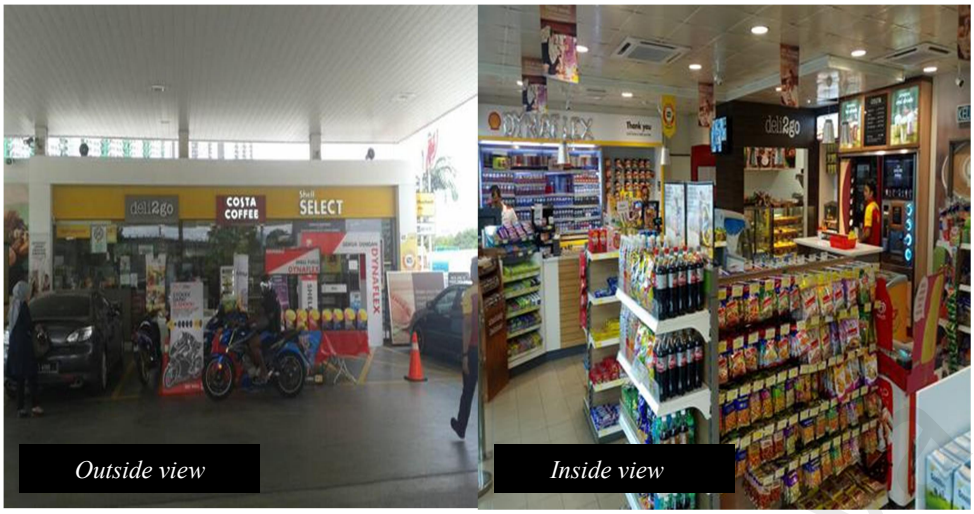


Figure 4.4 Main office and convenience store

- **Zone 4 – Support facilities area**

Support facilities areas are shown in Figure 4.5 below. These auxiliary building is located within the petrol station's vicinity. Toilets are located nearby forecourt area and easily accessible with adequate parking space where praying room for Muslim customers is located behind the main building (Zone 3) nearby exit point.

Figure 4.5 Support facilities

- **Zone 5 – Waste storage area**

Wastes generated from the petrol station are kept in a storage room (for scheduled wastes) and general waste bins are placed nearby the storage room. Zone 5 consists of a waste storage room as shown in Figure 4.6 below is located nearby main building area with access limited to authorized personnel only.

Figure 4.6 Waste storage area

According to data and observations made during visits, summary of station zones and its activities are tabulated in Table 4.1 below:

Table 4.1 Summary of Station Zones and Activities

Station zones	Area	Activities
Zone 1	Forecourt area - Fuel pump dispenser - Diesel pump dispenser - Oil interceptor	a) Vehicles refueling b) Checking vehicle engine oil by attendants c) Staff cleaning up vehicle wipers
Zone 2	Underground storage tank area	a) Storage of fuel and diesel b) Fuel tanker offloading products c) Maintenance job of the storage tank by authorized personnel

Table 4.1 Continued

Station zones	Area	Activities
Zone 3	Main office Convenience store	a) Administrative jobs b) Storage of stocks in store room e.g. lubricant oil, convenience store products c) Payment activity at cashier counter d) Preparation of food and beverages for "Deli-to-go" e) Customers dining in
Zone 4	Support facilities area - Toilets - Praying room	a) Cleaning toilets by janitor b) Storage of detergent in janitor room c) Cleaning up ablution area by staff d) Cleaning praying room
Zone 5	Waste storage area	a) Storage of scheduled wastes b) Storage of chemical spill kit c) Storage of PPE for cleanup activities d) Collection of wastes by appointed waste collectors

4.1.2 Observation Findings

Findings from the observation made are shown in Table 4.2 below which marked with areas that either good practice or potential for improvement. The table is based on categories of main environmental impacts such as energy and chemicals use, waste generation, wastewater discharge, oil water separator and fuel tank dispensing system.

Table 4.2 Observation Findings

Item	Findings	Area	Good Practice	Potential for improvement
Energy usage	1) Using electricity as main source	Main office/Convenience store		
	2) Separate electricity panels for main office, Deli-to-go and pump dispensers		√	
	3) Emergency stop button located nearby DB panel in store room at main office – easily accessible		√	
	4) Light is switch on in main office during office hour			
	5) Periodic checking and maintenance of electrical equipment being conducted accordingly by appointed contractor		√	
	6) All electrical appliances are in good condition and daily check being conducted by in-charge personnel		√	
Chemicals use	1) All washing detergents being labeled and stored in janitor room	Toilets/Store rooms	√	
	2) Lubricants engine oil (in container) being stored in store room, poor housekeeping observed			√
	3) No SDS being displayed where chemicals are stored			√
	4) Inadequate secondary container being placed in store room where chemicals and oil are kept			√

Table 4.2 Continued

Item	Findings	Area	Good Practice	Potential for improvement
Waste generation	1) General wastes generated are food wastes, papers, plastics, carton boxes, packaging materials, etc. 2) All general wastes are being disposed designated containers placed outside the main building where contractor will come and collect the wastes twice weekly. 3) The wastes generated are mostly from toilets, office and convenience store 4) No separate bins available for recycle wastes e.g. paper, aluminum and plastic. Only carton boxes are stored in different store room for recycle purposes 5) Scheduled wastes generated are waste oil and contaminated soil/rags from cleanup activity 6) Scheduled wastes are being handled, contained, labeled and stored in separate storage room 7) Only authorized personnel handling the scheduled wastes and have access to storage room 8) Secondary containment and spill kit available in the store room	All areas	√ √ √ √	√
Wastewater discharge	1) Wastewater generated from toilets, office, convenience store and praying room being channeled to municipal sewer line	All areas		

Table 4.2 Continued

Item	Findings	Area	Good Practice	Potential for improvement
Oil water separator	1) Liquids from fuel dispensing area (forecourt) being channeled small drainage system around the area before going into the oil interceptor	Forecourt	√	
	2) Oil interceptor being cleared and maintained weekly by staff		√	
	3) No signs of oil spill present at forecourt area		√	
Fuel tank dispensing system	1) Fuel pump dispenser automatically controlled once payment made	Forecourt	√	
	2) Any overspill during refueling will be managed by staff using spill kit available to keep the spill away from drainage and ground		√	
	3) Small drainage system available at dispensing area to contain small spill		√	
	4) Vapor recovery system available		√	
	5) Dispenser containment system being checked daily by staff using documented checklist		√	
	6) Emergency response card/instruction available at all pump island to alert customers		√	
	7) Staff are present at forecourt area in response of any emergency			
	8) Staff wearing hi-vis jacket at all time when being at forecourt area		√	
	9) Traffic management at the area are being controlled well by staff		√	

Areas that are found to have potential for improvement in terms of HSE management and practices are as follow:

1) Store room in main office

The store room located in main office stores stocks of lubricant oil for sale purposes. It was found that the area has poor housekeeping practices as shown in Figure 4.6 below. The stacking of these products and other items in the store room can lead to falling hazards to people and slip, trip and fall. Besides that, no adequate secondary containment available to contain any possible spillage or leakage from these oil containers.

Figure 4.7 Store room in main office

2) General waste bins area

There are two types of wastes being generated by the petrol station which are general and scheduled wastes. These wastes are contained in designated containers as per legal

requirements. Although the petrol station generates recycle and non-recycle wastes, but no 3R (Reduce, Reuse and Recycle) practice being implemented on site i.e. no designated recycling bins available as shown in Figure 4.8 below.

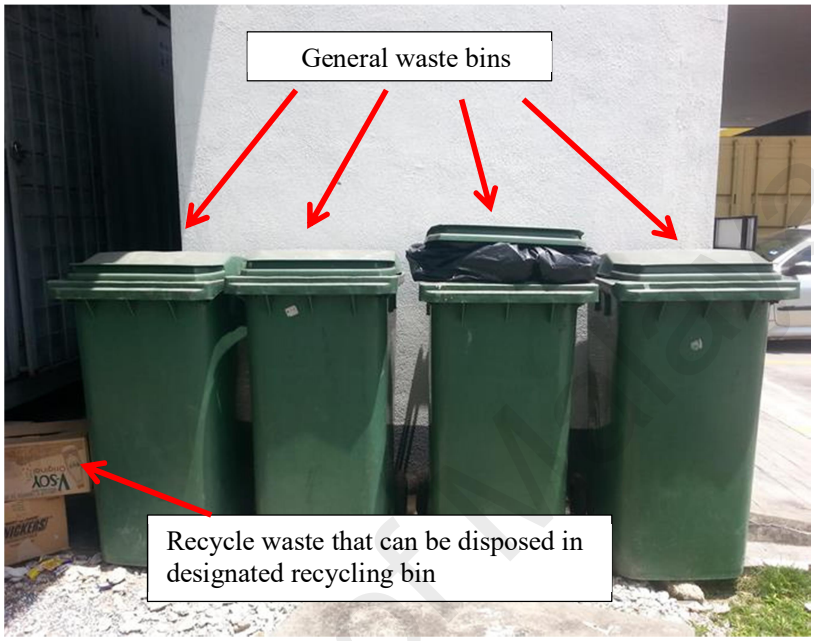


Figure 4.8 General waste bins area

3) Risk at forecourt area

Forecourt area is the busiest area in the petrol station. From the observation, this area is where most movement of people and vehicles takes place. Figure 4.9 shown the area where most likely accident involving people and vehicle will occurs. Customers need to cross the forecourt area to make payment at the cashier counter or going to the convenience store located in the main building. At the same time, vehicles exiting from the petrol station will use the same route. Both customers and also drivers need to be extra careful when crossing the area to avoid any unwanted incidents.

Figure 4.9 Risk at forecourt area

Recommendations suggested for these areas are discussed in the Chapter 5 for further improvement.

4.2 EMS Assessment Findings

Assessment on the EMS implementation was carried out using an EMS assessment checklist (refer to Appendix B) which was adapted from the ISO 14001 EMS standard. The assessment was based on 14 EMS elements that are listed below.

1) Environmental policy
2) Environmental aspects
3) Legal and other requirements
4) Objectives, targets and program
5) Resources, roles and responsibility
6) Competence, training and awareness
7) Communication
8) Documentation and document control
9) Operational control
10) Emergency response and preparedness

11) Monitoring and measurement

12) Non conformity, corrective and preventive actions

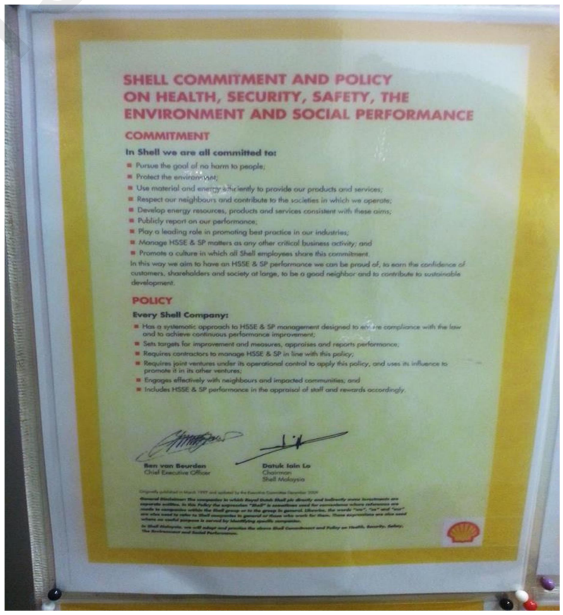
13) Internal audit

14) Management review

Findings from the assessment are categorized under four categories based on the conformity against the 14 EMS elements mentioned before. Overall, the site has fulfilled most of the elements in EMS which categorize as "complete conformity". However, there are some elements that go under "partially conformed" and "opportunity". Results of the EMS assessment finding are detailed out as per following:

- *Environmental Policy*

This petrol station has "complete conformity" against this element by establishing Shell HSSE Policy which was signed by Shell Top Management. The policy as shown in Figure 4.10 below is displayed at main office and communicated to all staff whenever there are any updates required.


SHELL COMMITMENT AND POLICY
ON HEALTH, SECURITY, SAFETY, THE
ENVIRONMENT AND SOCIAL PERFORMANCE

COMMITMENT

In Shell we are all committed to:

- Pursue the goal of no harm to people;
- Protect the environment;
- Use material and energy efficiently to provide our products and services;
- Respect our neighbours and contribute to the societies in which we operate;
- Develop energy resources, products and services consistent with these aims;
- Publicly report on our performance;
- Play a leading role in promoting best practice in our industries;
- Manage HSSE & SP matters as any other critical business activity; and
- Promote a culture in which all Shell employees share this commitment.

In this way we aim to have an HSSE & SP performance we can be proud of, to earn the confidence of customers, shareholders and society at large, to be a good neighbor and to contribute to sustainable development.

POLICY

Every Shell Company:

- Has a systematic approach to HSSE & SP management designed to achieve compliance with the law and to achieve continuous performance improvement;
- Sets targets for improvement and measures, appraises and reports performance;
- Requires contractors to manage HSSE & SP in line with this policy;
- Requires joint ventures under its operational control to apply this policy, and uses its influence to promote it in its other ventures;
- Engages effectively with neighbours and impacted communities; and
- Includes HSSE & SP performance in the appraisal of staff and rewards accordingly.

Ben van Beurden
Chief Executive Officer

Datuk Iain Lo
Chairman
Shell Malaysia

Figure 4.10 Shell HSSE Policy

- *Environmental Aspects*

Generally, the site identified activities that contribute to environmental impact. Potential environmental incidents that relates to their activities are communicated through "Environmental Alert" leaflet as shown in Figure 4.11 below that was displayed at forecourt area and main office. However, no environmental aspect and impact register was generated on site to officially identify these activities and this element was found to be "partially conformed".

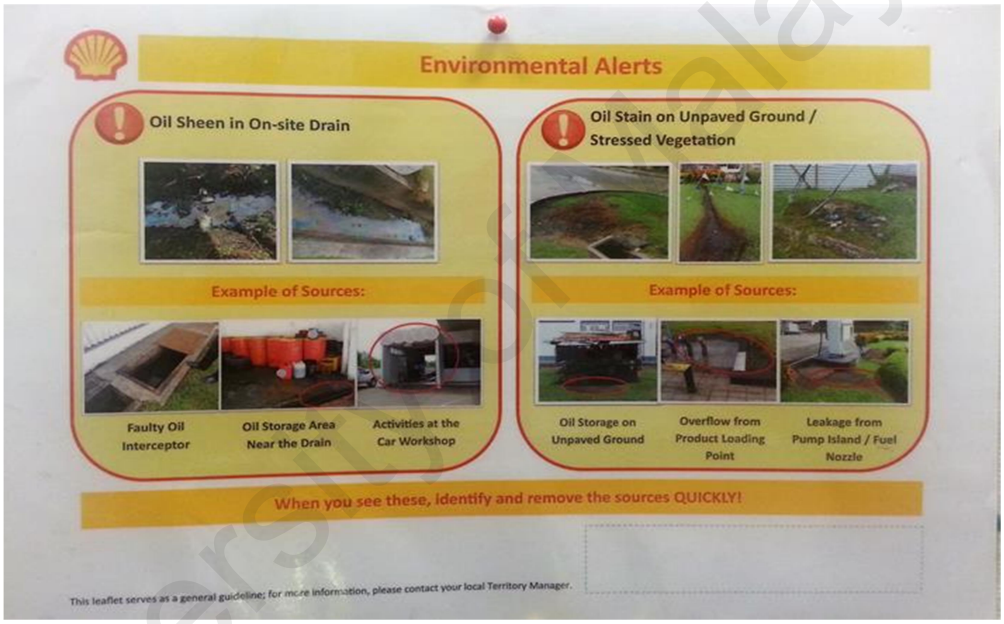


Figure 4.11 Environmental Alert leaflet

- *Legal and other requirements*

Under this element, it was found that the site need to comply with relevant legal requirements as described in Shell Internal Guideline for HSSE. Applicability of these requirements is communicated by Shell to its retailers. The site was found to have all relevant permits and licenses updated and being displayed at the main office. This finding is categorized under "complete conformity".

- *Objectives, Target and Program*

The site has established its HSSE objectives, target and program through the Retailer's Annual HSSE Plan (refer Appendix C). This annual plan listed out activities that need to be carried out by the petrol station throughout the year to achieve its HSSE goals. This element is found to be "complete conformity".

- *Resources, Roles and Responsibility*

According to Shell Internal Guideline for HSSE, the sole responsibility of HSSE management on site is by its retailer Manager. A comprehensive listing of retailer's roles and responsibility can be found in the guideline. Shell is also providing necessary support in terms of technology and financial resources. This element was categorized under "complete conformity".

- *Competence, Training and Awareness*

All personnel whose work can cause significant environmental impacts are competent by training and awareness. These personnel undergo competency training such as first aid, chemical handling, emergency response and food preparation as stipulated under legal requirements. The site retained all its training records (refer Appendix D), certificates and licenses in main office. This element was found to be "complete conformity".

- *Communication*

Any complaints/feedback or incident reporting made by staff or third party is directly channel to the retail Manager through Shell Incident Reporting Form. This form is made available in English and Bahasa Malaysia to all staff and customers. Besides that,

customers may channel their concern on any issues including HSSE management to Shell via "Voice of Customers (VOC)" system. This element was found to be "complete conformity".

- *Documentation and document control*

Under this element, it was found that the site has its own HSSE documentation and control system. The review of documents, including guidelines were made by Shell and communicated to the retail Manager. All documents are kept in main office for reference and internal audit purposes. The site has found to be "complete conformity" in this element.

- *Operational Control*

The site has established monthly and quarterly HSSE checklist (refer Appendix E) which covers all aspect of operation. Items that need attention will be highlighted and discussed in the HSSE Monthly Meeting. This element is categorized under "complete conformity".

- *Emergency Response and Preparedness*

Shell has established an Emergency Response Procedure as one if its operational procedures. The site was found to be "complete conformity" where it has completely adhered to all requirements under this procedure. This includes training and awareness, conducting fire and emergency response drill, spillage response and such. Figure 4.12 shown example of emergency response training (loss of product containment near fuel discharge area) conducted on site. Besides that, each personnel have their own roles and responsibility in emergency response and the organization structure can be referred to Appendix F.

Figure 4.12 Example of Emergency Response Training on site

- *Monitoring and Measurement*

Based on requirements in this EMS element, the site has yet to generate specific environmental monitoring and measurement list. This listing can be used to keep track of all relevant environmental monitoring which can be incorporated under the Annual HSSE Plan and may be useful as environmental performance indicator. Thus, this element is found to be under "opportunity".

- *Non-conformance, Corrective and Preventive Actions*

Retail Manager is responsible in handling, investigating and controlling any nonconformity issues arise in the petrol station. The process flow of handling such issues is described in the internal guideline. Issues need to be tackle within the time frame given and further investigation will be conducted by the Territory Manager (TM). This element is categorized under "complete conformity".

- *Internal Audit*

Internal audit on HSSE compliance is carried out by the TM quarterly. Report of this audit will be communicated to the petrol station's Manager and any issue pertaining operation shall be disseminating to all staff during HSSE Monthly Meeting. This element is categorized under "complete conformity".

- *Management Review*

Under this element, the site was found to conduct periodic management review to evaluate HSSE performance on site. The site also established a system called "Navigator" to monitor staff individual targets which includes HSSE aspects to meet the HSSE objectives and target. The site was found to be in "complete conformity" for this EMS element.

4.3 Physical and Chemical Hazards Identification

Petrol station workers are exposed to assorted types of risks including physical and chemical hazards. Physical hazards are heat, loud noise, and odor whereas chemical hazards are in contact with vapor, gases and dusts. During the walk-through observation and EMS assessment conducted, workers are exposed to hazards such as in contact with fuels and other chemical products, standing close to the fuel pumps, long exposure to noise and heat, risks of being run over by vehicles, repetitive movements and standing for long hours.

Based on the information above, zones and areas in the petrol station that poses physical and chemical hazards are being identified in Table 4.3 below:

Table 4.3 Physical and Chemical Hazards at Dziyalite Resources

Station zone	Area	Description of risks	Physical/Chemical hazard
Zone 1	Forecourt	a) Exposure to noise from moving in and out vehicles, surrounding areas (nearby highway) b) Expose to heat c) Expose to odor as the area is an open space	Physical hazard
Zone 2	Underground storage tank	a) Exposure to vapor and fumes during offloading of fuel from tanker b) Expose to heat and odor	Physical and chemical hazards
Zone 3	Main office and convenience store	a) Expose to component of gasoline e.g. engine oil b) Expose to cleaning products	Chemical hazard
Zone 4	Toilets and praying room	a) Exposure to cleaning products	Chemical hazard
Zone 5	Waste storage room	a) Exposure to flammable materials	Chemical hazard

In general, these workers are exposed to chemical products such as toluene and xylene (BTEX), aromatic hydrocarbons, benzene, component of gasoline and chemical solvents (Haest et al., 2010). Automobiles are considered to be the main source of benzene in petrol stations. Exposure to benzene is the highest risk as it is characterize by high carcinogenic potential which pose danger to human health even in small amount (Udonwa et al., 2009).

CHAPTER 5: DISCUSSION

5.1 Environmental Management – Risk and Opportunity

Improving environmental performance is generally about managing risk and taking advantage of favorable circumstances that will boost efficiency and profits especially for small business like the petrol filling station.

Major fuel spill or other environmental occurrence could pose risks in terms of environmental prosecutions or fines, harmful effects on the health, safety and productivity of staff and tarnishing company's image and reputation.

Bettering environmental performance provides opportunities in making business more valuable and feasible in the long run. For example, small changes that can save an amount of money such as installing energy efficient lighting, regularly maintaining the machines and equipment which in turn can cut electricity costs.

These and other good practices can be escalated when environmental issues being managed and are integrated with other business planning which then becomes part of continuous improvement.

5.2 Recommendations

Results obtained from the walk-through observation and the EMS assessment on site found some room for improvement in terms of environmental management system as well as safety aspects. Recommendations are divided into three main aspects which are outlined and explained in next section.

5.2.1 Establishment of Environmental Aspect & Impact Register

Evaluation of the environmental impacts associated with activities, processes and services is one of the most important steps in EMS implementation (Seiffert, 2008). Although Dziyalite Resources has a set of guided documents on managing HSE issues

on site, but one of the findings from EMS assessment indicated that the site has no Environmental Aspect and Impact Register.

Further discussion being made with the retailer Manager and Supervisor on the establishment of the register and the management has agreed to produce a set of register as shown in Table 5.1 below:

Table 5.1 Environmental Aspect and Impact Register

AREA	ACTIVITIES	ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT
Forecourt	Vehicle refueling	Oil spill from refueling	Soil pollution, groundwater contamination
		Leakage of oil from vehicle	Soil pollution, groundwater contamination
		Release of fume from vehicle (engine running while refueling)	Fire/explosion, air pollution
		Generation of scheduled waste from cleanup activity	Soil pollution
Underground storage tanks	Offloading of fuel from lorry tanker	Oil spill from lorry tanker	Soil pollution, groundwater contamination
		Product contamination due to crossover	Soil pollution, groundwater contamination, fire/explosion
		Release of fume	Air pollution
		Generation of scheduled waste from cleanup activity	Soil pollution

Table 5.1 Continued

AREA	ACTIVITIES	ENVIRONMENTAL ASPECT	ENVIRONMENTAL IMPACT
Main office	Administration activities	Usage of energy	Greenhouse gases emission
		Usage of paper	Soil pollution (cutting trees to produce paper)
		Generation of waste	Soil pollution (landfill overflow/overuse)
Convenience store	Food and beverages preparation	Usage of energy	Greenhouse gases emission
		Wastewater discharge	Water pollution
		Generation of waste	Soil pollution (landfill overflow/overuse)
		Release of heat (microwave heating)	Nuisance
Toilets	-	Usage of cleaning detergent	Soil pollution, groundwater contamination
		Usage of energy	Greenhouse gases emission
		Wastewater discharge	Water pollution
		Generation of waste	Soil pollution (landfill overflow/overuse)

Based on the register above, the site can easily identify areas of activity that can be further improved in terms of environmental management. However, training must be conducted for staff to enhance their education and awareness on environmental aspects and impacts. The register must be reviewed as and when necessary i.e. if there are any additional activities on daily operation.

The process of learning and adapting environmental aspect impact may have defer due to lack of manpower, no site specific environmental specialist, low commitment from management and no requirement to obey in the internal standard.

5.2.2 Setting up an Environmental Indicator

According to (P. Rao et al., 2006), SMEs are recommended to use environmental indicator in order to enhance their environmental performance through three categories; a company's environmental impacts, the management's environmental activities and external condition of a company's environment.

The register of environmental aspect impact can be further analyzed with identification of significant aspects. These significant aspects will then be rank according to its priority based on business availability of resources and technology. Prioritization of significant environmental aspects can be used as environmental indicator to be set in environmental objectives and targets.

Based on EMS assessment conducted, Dizyalite Resources has established an Annual HSSE Plan. However, the plan may not specifically or aiming directly on environmental performance. Thus, by identifying these environmental indicators, the site may integrate it with the existing HSSE Plan.

5.2.3 Other Potential Improvements

From the assessment and observation conducted, one of the areas that need improvement is housekeeping. Poor housekeeping which was observed in the store room can lead to untoward incidents like slip, trip and fall, falling from height, and such. The management should implement 5S activity once a month and educate staff to maintain the cleanliness of the room.

Petrol station can be very risky during rush hour which is when the volume of vehicle coming in and out of the station is particularly high. Customers need to cross the forecourt area to make payment at cashier which is located in main building. A zebra

crossing, caution signage or walkway barricade may be provided to minimize and reduce the risk of accident at the area especially during rush hour.

Other than that, generally a petrol station generates a lot of non-hazardous wastes that can be recycled such as carton boxes, paper, plastic, tin or aluminum can and etc. Although the site recycled most of its carton boxes and keep it in a separate storage room, but the practice of reduce, reuse and recycle (3Rs) can be further improve where the site can prepare separate recycling bins at the site e.g. in forecourt area.

Rainwater harvesting system is one of the ways a petrol station can invest on in the long run. Since Malaysia receive plenty of rainfall throughout the year, collecting rainwater and use it back in daily operation such as for cleaning, toilet usage and etc. may reduce the dependency on main water source. This can demonstrate how the petrol station is committed in helping preserve the environment.

5.3 Limitations of Environmental Management System at Dziyalite Resources

On the other hand, despite many benefits gained from the implementation of EMS in small business, there are barriers that may directly or indirectly impede the process. According to a study by (Rafiziee & Razak, 2010), four areas of concern in implementation of EMS are as follow:

a) Lack of available resources

This can be seen in Dziyalite Resources where lack of manpower could damper the initiative to improve environmental performance because most of the workers have limited knowledge in term of education and experiences and they basically rely on the Manager and Supervisor to manage issues on HSE.

b) Information barriers

Almost all permanent staff in Dziyalite Resources is non-Malaysian and most of them do not speak fluent Bahasa Malaysia or English language. This can be difficult for the management to communicate and relay message on certain HSE issues and the adaptation and continuous learning may consume time and cost.

c) Internal attitude

The issues such as inconsistence of support from management and refusal to change company culture are internal attitude that limits the process of EMS implementation. However, in Dziyalite Resources, these issues are not an obstacle because the management is always committed in achieving their goals on HSE.

d) Perceptions

Generally, many small businesses perceived cost as the main barrier in implementing the EMS. This then lead to the incredulity of environmental initiative benefits. From the point of view through interviews and discussion with staff, it can be seen that they did not have such perceptions towards any environmental initiatives that the management has planned.

5.4 Shell Internal Guideline on Health, Safety, Security and Environment (HSSE)

Shell developed a site policy and procedures manual to help retailers in managing health, safety, security and environmental issues at site. These documents are internally distributed to all retailers and are a comprehensive guideline from leadership to site operation procedures to risk assessment and emergency response.

This procedure manual consists of four main parts which are:

a) Leadership and Commitment

This section emphasized the importance of retailers to develop HSSE culture within the organization where site staffs are able to understand and apply the HSSE procedure in a way that can prevent accidents or causing harm to themselves and others. Besides setting a good example and plays a clear role on HSSE leadership.

b) Group HSSE Policy and Rules

A signed copy of policy is available on site. The Shell Golden Rules provides framework on how to achieve further improvement in HSSE performance by complying with the law, standard and procedure, intervene in any unsafe act and non-conformance situations and also to respect neighbors. Shell Life Saving Rules imply to eliminate incidents at site, in ensuring safe experience for customers, retailer, site staff and contractors. There are 12 mandatory rules including working with valid work permit, no smoking anywhere within the site and no alcohol and drugs while working.

c) Retailers Responsibilities

This part detailed out comprehensive set of minimum standard for normal facilities at retail outlet which must comply with the Occupational, Safety and Health (OSHA) Act and legislation and also Retailer License Agreement (RELA). Important contents of this document are retailer is trained in all aspects of Shell's policy and legal requirements; retailer must ensure people carrying out tasks are competent, reviewed the risk involved and have necessary personal protective equipment (PPE) available to do task.

Besides that, retailers to identify potential risk involved during operation and to take preventive and protective measures by carry out HSE risk assessment of site operation, implement emergency response procedure and etc. Retailer also must conduct monthly HSSE checklist, ensure all licenses and permits updated and maintained on site other than keeping a register of records and updated whenever there are changes.

d) HSSE Procedure

Four key priorities are stipulated under this operational procedure; site safety, wet stock management, security and emergency response. The summaries of requirements of these procedures are shown in Table 5.2 below:

Table 5.2 Shell HSSE Procedure Summary

PROCEDURE	AREA / ITEM	DESCRIPTION
Site Safety	Forecourt and dispensing equipment	• There are six minimum safety standard which must be clearly identified and communicated • No smoking anywhere within station, no use of mobile phones, engine switch off during refueling etc.
	Working and service bay	• Generally all tools must be used only by authorized people, electrical equipment and connection in good condition and regularly checked • Inspection only by qualified electrician, certificate of equipment readily available • Facilities must be kept clean at all times
	Hazardous area (zone) classification	• Detailed out how hazardous zone are classified by determining the likelihood of presence of an ignitable fuel-air gaseous mixture
	Contractor Management	• All high risk activities requires the contractor to have "Permit to Work" issued by Shell
	Usage of PPE	• PPE must be worn correctly while working especially at the forecourt area • Safety vest is a must to those working at that area
	Waste and Energy Management	• Usage of energy shall be conserved • Waste separated and disposed accordingly as per regulation requirements

Table 5.1 continued

PROCEDURE	AREA / ITEM	DESCRIPTION
Site Safety	Energy Efficiency	• Creating staff awareness, installing own site procedures, monitor energy efficiency on site • Equipment : shop, lighting, refrigeration, building, toilets etc.
	First Aid Requirements	• As stipulated under Section 15 (1) of OSHA 1994 • First aider must be available on site with one person per shift, attended training recognized by DOSH once every three years and record of training must be kept on site • Casualty and treatment given must be recorded by first aider • First aid box must be regularly maintained by first aider
Wet Stock Management	Fuel Spill and Leakages	• Regular check by retailer to ensure equipment are in good working condition and compliance to legal requirements • Site fuel handling procedures are adequate and consistently apply on daily basis, firefighting equipment are in first class condition, regularly conduct fire drills • Site staff have attended competency training on safety, firefighting, first aid • Storage of fuel in underground tanks are according to legal requirements with daily and periodic check and inspection being made
	Oil spill kit	• Minimum items available and equipped
	Safety Data Sheet (SDS), Chemical handling and labeling	• Must be made available and communicated to all staff • Staff must be trained in chemical handling once a year

Table 5.1 Continued

PROCEDURE	AREA / ITEM	DESCRIPTION
Wet Stock Management	Crossover product	• Different product went into different product storage tank during lorry tanker discharge • Affect quality of product and resulting in contaminations • Staff must be trained to handle situation and procedure are available
Emergency Procedure	Emergency Response Plan	• All staff must have access to Emergency Response Plan at all times and trained in emergency situations • Incident must be reported using Incident Reporting Form and immediate cases like death, severe injury, spillage, leakages, fire must be reported to Shell • Site level emergency response drills must be conducted monthly with pre-defined scenario as determined by Shell

CHAPTER 6: CONCLUSION

6.1 Conclusions on Research Outcomes

Overall, the management of Dziyalite Resources is open to suggestion in term of improving their health, safety and environmental management. Specific objectives of this study that was prescribed in Chapter 1 previously are concluded in the research outcomes as follow:

- **Identifying activities and processes at a petrol filling station as a SB that potentially contributes to environmental issues.**

The walk-through observation and assessment exercise has open up a helpful information and input on environmental issues that the organization is facing. Based on findings from walk-through observation and assessment, this research is able to identified activities and processes at the petrol station that potentially contributes to environmental issues.

- **Identifying potential risks associated to physical and chemical hazards at the premise**

This research is able to identify potential risks emerging from the petrol station activities that associated to physical and chemical hazards present on site through walk-through observation.

- **Assessing the environmental management system of the area**

Implementation of environmental management system in the petrol station was assessed through EMS assessment that was conducted based on EMS elements adapted from the ISO 14001 EMS standard.

- **Suggesting suitable environmental management system approaches**

Suitable environmental management system approaches for the petrol station was suggested in this research.

6.2 Recommendation for Future Work

One of a study by (H. A. Ferenhof, L. Vignochi, P. M. Selig, Á. G. R. Lezana, & L. M. Campos, 2014) summarized that EMS is a useful tool for reducing costs by generating environmental improvements, intangible benefits and improving the attitudes of SMEs towards sustainability.

Furthermore, based on study conducted and generation of suitable environmental management approaches, further research could extend on gathering the perception of environmental management system from the petrol station workers and identification of significant environmental impacts from a petrol station's activities.

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